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OUR WATERWAY REQUIREMENTS

By ROBERT M. BROWN

Legislation

FALLACY OF PRESENT POLICY

The River and Harbor Appropriation Bill passed in July, 1917, originally carried \$38,000,000 to be distributed among 300 projects, 81 of which are new. In the report of the Committee on Commerce¹ in 1916 it was explained that a few waterways for which appropriations were made accommodated relatively a very small commerce because of the uncompleted state of the waterway, business depression, or "local causes of a temporary nature." The Committee in all cases continued the appropriation on these projects "in the hope that increased benefits may follow," but with the threat that unless an increased traffic be shown in a reasonable time the appropriation for maintenance would be discontinued. Herein lies one of the greatest fallacies of waterway management, namely, that commerce will result from waterway construction. Waterways should be improved, not to create commerce; commerce should create them.

INADEQUACY OF SPECIAL BILLS

There are some signs that an omnibus river and harbor appropriation bill may be succeeded in time by a commission-governed waterway appropriation. A few years ago the Newlands Bill² began a consistent fight for a new waterway policy. The failure of this bill was the result, probably, of its altruistic character—the detailing of an enormous sum of money into the hands of a few people without definite instructions as to expenditure—and of its lack of promise of quick results. The minority report of the last river and harbor appropriation bill³ advocated a national waterway commission⁴ with exclusive authority over waterways as the one way out of the difficulty. The recommendations of this commission would be under Congressional approval, and, if the districts of the members were too severely neglected, there would be a chance to block the measure by establishing a deadlock. The Newlands Bill carried a lump appropriation of \$60,000,000 per year for ten years to be placed at the disposal of a commission. Our waterways have suffered, are still suffering, from the unsatisfactory allotments of the annual river and harbor appropriation bill; it may be that a commission management would obviate the evils of this bill,

¹ *Senate Rept. No. 420, 64th Congr., 1st Sess., p. 10.*

² *Senate Bill No. 2739, 63rd Congr., 1st Sess.*

³ *House of Repr. Rept. No. 1289, Part II, 64th Congr., 2nd Sess.*

⁴ *House of Repr. Bill No. 6321, 64th Congr., 2nd Sess.*

but at the same time there is some danger of establishing a form of government over waterways which would be only different in name.

Special bills calling for specific action on waterways are introduced into Congress during every session, and these, unless they are in accord with a national waterway policy, may be a great menace to our waterway system. For instance, there was introduced into the House of Representatives a bill⁵ to provide for the control of the Mississippi and Sacramento River floods. The passage of such an act would be disastrous, probably, to all other functions of the river. Flood control is one of the necessities of waterways but it must be managed in such a way that navigation be not blocked, reclamation and protection be permitted, and water conservation be maintained. Since 1896 we have expended over \$560,000,000 through the medium of the river and harbor acts, an average approximately of \$27,000,000 per year. As a large amount of this money each year is appropriated for maintenance and not for the continued improvement of partially regulated streams, and as some of it is expended for projects of an experimental nature many of which are abandoned later, it is not an exaggeration to state that some of this money has been wasted. A strict accounting of this sum during the last twenty-one years would probably yield astonishing results. It is, of course, purely a mental exercise to figure out what would have resulted from the expenditure of this sum of money by a competent waterway board on one worthy project each year for twenty-one years, not in maintenance amounts but in sufficient quantities to complete each waterway and to make it an effective carrier of traffic.

AIMS OF VARIOUS ORGANIZATIONS

In addition to the bills of special nature, there are a number of powerful associations which, each devoted to a certain project and backing it with great persistence, have a narrow or limited view of our waterway problem. These groups are interested naturally in the task nearest at hand. The Mississippi River Levee Association has done an amount of commendable work in advertising the necessity of protection for the Mississippi Valley; but, in advocating one type of remedy to the exclusion of all others and in demanding protection at the expense of proper uses of the great river, this association has not been a national asset.

The Mississippi River Commission can point to a long record of service, but the act that created it does not permit the commission to conduct its endeavors along approved lines of water conservation, and furthermore it has committed itself to levee completion as the only method of protecting the alluvial basin to such a degree that no other policy can be entertained by it. In twenty-eight years two-thirds of the necessary yardage of levees have been completed. Out of 1,564 miles of levees in the system 1,237 are today below commission grade. Nearly a fourth of the area seeking pro-

⁵ *House of Repr. Bill No. 14,777, 64th Congr., 2nd Sess.*

tection was overflowed during the 1916 flood. An excessive flood, which may occur any year, will always be disastrous to the basin under this régime. The commission has maintained a nine-foot waterway of 250 feet width since 1902 except that "for 18 days in 1903 and a few days in 1904 the depths at one bar were 8 and $8\frac{1}{2}$ feet. For a few days there was less than 9 feet at five bars in 1908, seven bars in 1910, and five bars in 1914. At one bar in 1913 the required width was not maintained."⁶ This is not a very commendable record of achievement for twenty-eight years: the fault may lie in the plan of appropriations or it may lie in the policy of the commission or in both.

The Atlantic Deeper Waterways Association rarely comes into conflict with the riverway organizations except as a factor in the distribution of the annual appropriation. The demand for a fourteen-foot channel from the Great Lakes to the Gulf was as dangerous and as purely selfish a measure as has existed in recent years. A few years ago the St. Louis convention of the Lakes-to-the-Gulf Deep Waterways Association sent a resolution to Congress "demanding that no less than fourteen feet should be permitted and should be accepted."⁷ It was a movement tending to improve the situation of a small region to the neglect of other regions. The Ohio River, now the best traffic carrier of the Mississippi Basin, could not be joined to such a system except at a cost that would in itself be prohibitive. There was little reasonableness in the demand for a fourteen-foot depth, as the Lake carriers could not be floated economically in so shallow water and the river steamers were of a much less draft. As long as transshipment is necessary the nine-foot channel of the Mississippi River Commission, which has been maintained fairly consistently, is of sufficient depth. It is a mooted question whether even this nine-foot channel has been worth while.

In addition to these pleaders for special waterway privileges and others of similar complexity, there have been unorganized adherents to a special line of action. The most vigorous of these today is the reservoir-control group. This form of regulation has not been adequately tried out on large streams, and for this reason the arguments of this group have neither been proved nor refuted.

LACK OF NATIONAL POLICY

It is evident that in our waterway policy we are a house divided against itself. The excellent reports which have been issued in recent years—the Final Report of the National Waterways Commission, 1912;⁸ the Report of the Inland Waterways Commission, 1908;⁹ and the Survey of the Mississippi River by a Special Board, 1909¹⁰—have perhaps accomplished something,

⁶ Annual Report of the Mississippi River Commission for the Fiscal Year Ending June 30, 1916, in *Rept. Chief of Engineers, U. S. Army, 1916*, Pt. III, pp. 3299-3521; reference on pp. 3302-3303

⁷ *Congressional Record*, Vol. 46, December, 1910, p. 178.

⁸ *Senate Doc. No. 469, 62nd Congr., 2nd Sess.*

⁹ *Senate Doc. No. 325, 60th Congr., 1st Sess.*, edition with appendix.

¹⁰ *House of Repr. Doc. No. 50, 61st Congr., 1st Sess.*, edition with atlas.

but they have not been able to stop the momentum gained by the annual omnibus river and harbor bill nor have they in any marked degree prepared waterway advocates and experts for a uniformity of purpose. There is no such thing at present as a national waterway policy; the strife after a share in the annual appropriation is a catch-as-catch-can affair which is rendered disgraceful by provincialism and political intrigue in Congress. There is no greater need for our waterways today than a definite statement of aim to which most of our waterway adherents would be willing to subscribe.

Natural Factors

LARGE TRIBUTARY POPULATION

Waterways cannot be expected to be successful unless they are connected with a densely settled district. Graphs I, II, III, IV, and V (Fig. 1) show

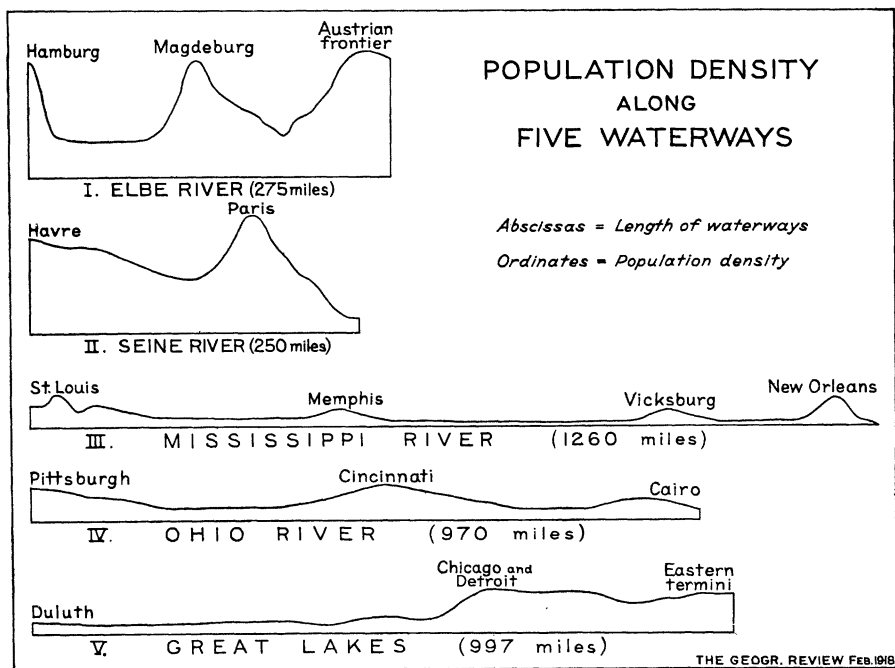


Fig. 1—Curves of densities of population along water routes.

the relative density of population along five waterways. The base lines are proportional to the length of the water routes, and the heights of the curves indicate the relative density of population along the way. The apexes of the Elbe curve (Graph I) mark Hamburg, the Magdeburg district, and the Dresden district (marked "Austrian frontier"); along the Seine (Graph II) the apex indicates the location of Paris; and in the Mississippi River curve (Graph III) southern Illinois (marked "St. Louis"), Memphis, Vicksburg, and New Orleans appear in slight irregularities. The Elbe

River is not adjacent to any coal mine district in Germany, so that the necessity for shipment up river from the port of Hamburg of this commodity to the centers of dense population and industry is great. A similar situation is found on the Seine. The upstream traffic from Havre to Paris exceeds the downstream traffic, and this difference is accounted for by the demands of the densely populated Paris district for coal. Above Paris, the bulk of the traffic, about 75 per cent of the total, is downstream, bringing grain and building materials to the city.

AVAILABLE TRADE COMMODITIES

Not easily separated from the density of population is the commodity factor in waterway success. It is almost an axiom that every waterway, to be successful, must have at its terminals either a dense population or a commodity of trade in sufficient quantity to promise a continual output. In the European waterways used as types above, the centers of great population, besides demanding the necessities of life, ship in return over the waterways their manufactured or agricultural products. Thus the Dresden district (Graph I) ships glassware and crockery, the Magdeburg district ships sugar and machinery, and the Paris district (Graph II) ships a variety of manufactured articles. The Great Lakes waterway illustrates the combination of a dense population and an economic commodity. Around the western terminus there exist in abundance iron ore and lumber, while the northwestern hinterland adds grain and flour. The maximum amount of annual tonnage passing through the Saint Marys Canal up to 1916 was 79,718,344 short tons (1913). Around the eastern terminus (Graph V) there is a fairly dense population which receives the raw materials of the Lake Superior district and converts them into manufactured articles. The Mississippi River has the fertile prairies, and, through its tributary the Ohio River (Graph IV), it taps the coal fields of western Pennsylvania; but along its route there are no thickly settled districts, and its southern terminus, New Orleans, is not a great city. Furthermore, the grain which made a large percentage of the tonnage of the river in the heyday of its commercial supremacy is not conveniently located at the water's edge, is too decentralized, and is thus not destined to be in any large degree a river-borne commodity. During the year 1915 the traffic on the Mississippi River passing any zone, as Memphis to Vicksburg, was 2,198,814 tons, made up largely of stone, gravel and sand (892,940 tons), and coal and coke (892,840 tons).

WATERWAYS AS OUTLETS

Short streams, as for example the western European rivers, become successful waterways independent of their direction of flow because they connect a densely settled interior with the coast by a direct line. In Russia, however, aside from the Neva and the Volga Rivers, very little tonnage is carried by the streams, although they are navigable in the aggregate for

nearly 110,000 miles. The east-and-west rivers through the heart of Russia are the important highways. The north-flowing streams to the Arctic and the south-flowing streams to the Black and Caspian Seas do not parallel heavy traffic lines, and consequently they bear little tonnage. A similar difficulty confronts the Mississippi River; its big tributaries open through the main stream to the sub-tropical regions rather than from one economic region to another in the middle zone, and it is thus of secondary importance as a waterway.

Development

NECESSITY FOR AN ADEQUATE CHANNEL

Given the natural factors for a successful waterway, one necessary essential is an adequate channel. We have been under a double illusion for a long period of time over the waterway situation: on the one hand we are tempted to believe that commerce will result from river improvement; and on the other we believe that railroad freight rates can be lowered by improving waterways. A waterway policy built upon faith will be a failure. Improvement of waterway channels is legitimate only where trade demands more or better carriers. When this stage is reached, it becomes a profitable investment to spend large sums of money to facilitate the movement of boats.

A national waterway scheme should attempt some co-ordination in the depth of the channel. A three-foot waterway on the upper Mississippi River increasing gradually downstream to a nine-foot waterway is not economical. Our railroad companies adopted independent policies of road gage in their earlier history, but the advantages in economy and time of a standard gage have driven every line of any other gage out of business today. The expense of unloading and loading at the stations where the river depth changes is argument enough against such a plan. The fourteen-foot waterway demand of the Lakes-to-the-Gulf Deep Waterways Association and the nine-foot waterway of the Mississippi River Commission are examples of the lack of uniformity in waterway ideals.

The time element must be considered as a factor in a successful waterway policy. Many of our great canals have been built to shorten sea routes. The more direct the route between any two points, the more profitable it will be. The great meanders of the Mississippi River make the distance from Cairo to New Orleans over twice as great by water as by rail. It is frequently claimed that the Rhine, in spite of its great meanders, is a successful waterway. It will be found on investigation, however, that the stretch of the Rhine from Mannheim, at the mouth of the Neckar and in the lower part of the great agricultural lowland, to Rotterdam carries most of the commerce of that stream. This stretch is remarkably free from windings, and the distance from Mannheim to Rotterdam by water, 351 miles, is only 41 miles (13 per cent) greater than that by rail. Our early railroads were a combination of grades and curves; these have been or are being elimi-

nated, sometimes at great expense. In like manner a successful waterway must straighten its line and employ as few dams as possible to be circumvented by time-consuming lifting and lowering contrivances.

Impediments to navigation should be eliminated as far as practicable. The uncertainty of most of our rivers has been a great handicap. On the Kentucky River¹¹ since the opening of the slack-water project some of the locks have been out of commission for a part of the time every year, being damaged by freshets or ice. In 1909 navigation was entirely suspended for 138 days and again in 1912 for 40 days. It is a sad commentary on our waterway policy to note that when all the commodities of the upper Kentucky River were, because of the uncertainty of the river way, accepting the higher tariffs of the railroads, the slack-water project, which, too, was never successful because of its inadequacy, became an obstruction to the shipment of lumber, the only industry of importance in the upper river today. The result has been that some of the lumber mills below the dams have had to go out of business, and mills have sprung up above the dams. A frequent obstacle to navigation in nearly every river in the country is the excessively high or low water stage of the stream, but this difficulty is one that in most rivers can be easily overcome.

REDUCTION IN OPERATING COST

A decrease in the cost of handling commodities and of operating is another essential to a successful waterway. Here lies one of the reasons for a standardized canal system, especially on shallow streams. Railroads send cars from producer to consumer under the régime of a standard rail gage. The ocean and Great Lakes traffic lines and the Ohio coal carriers have reduced overhead charges to a minimum and have achieved success. Terminal facilities of most river stations, however, have not improved since their inception. It is reported¹² that the number of pounds of fuel expended per ton-mile is on the average for the railroads 0.066; for the Great Lakes carriers, 0.029; for the Ohio River tow boats, 0.021; and for the Mississippi River packet, 1.129. Evidently the packet is not the most economical carrier. In the number of days' labor per 100,000 ton-miles, the same authority quotes for railroads, 2.5; for the Great Lakes carriers, 0.9; for the Ohio River tow boats, 1.31; and for the Mississippi River packets, 63.64. The geographers who walked over the wide sloping cobbled approach to the steamer which took the Transcontinental Excursion of the American Geographical Society down the river in 1912 from Memphis can easily believe that the expense of loading and unloading a Mississippi River freight boat must be excessive. When there is proper equipment and the haulage is moderately long, so that the expense of terminals is distributed over a considerable

¹¹ Mary Verhoeff: *The Kentucky River Navigation*, *Filson Club Publs. No. 28*, Louisville, 1917.

¹² W. M. Black: *Some Problems of Inland Waterway Transportation*, *Rept. of Proc. of the Ninth Ann Convention of the Atlantic Deeper Waterways Assoc. Held at Philadelphia, Sept. 12-15, 1916*, Philadelphia 1917, pp. 54-69; references on p. 68.

mileage, water transportation rates are lower than rail rates. This is true on the Great Lakes, where one ton of iron ore is transported an average distance of approximately 850 miles for 65 cents (including cost of loading and unloading, carrying, and terminal charges), or at the rate of less than eight-tenths of a mill per ton-mile; and also on the Ohio River for the 2,000 miles from Pittsburgh to New Orleans, where the charge is \$1.25 per ton for coal, or at the rate of about six-tenths of a mill per ton-mile. The lowest rail rate on coal in the United States is two and one-half mills per ton-mile.

Railroad competition has been frequently assigned as the reason of the declining traffic on our waterways. In many instances, however, the waterways have been so inefficiently managed that competition is hardly the proper word to use. Many waterway advocates, furthermore, charge the railroads with malicious competition and demand in strong terms federal control. Legitimate railroad competition with any waterway is particularly formidable because of the ability of the roads to keep their lines open under varying conditions, to move freight quickly, to overcome the decentralization of products by numerous interramifications of lines, and to transport commodities without break of bulk to a greater extent than can be effected by any waterway system. The time is going by when railroads can be charged with manipulating rates in order to offset competition, and when waterways can be advocated as a factor in railroad rates. Formerly waterways exercised a potent influence in rate reduction, but this influence was extremely limited in extent, and the loss which the railroads suffered because of waterway competition was generally charged against the public on roads that had no competing line. The extension of the powers of the Interstate Commerce Commission throughout the country will be instrumental probably in controlling traffic rates so that the injustices of former years can no longer be alleged.

CONSIDERATION FOR A RIVER'S OTHER FUNCTIONS

Finally, a river waterway should be so regulated as to allow the river to perform its other legitimate functions, and, conversely, other uses of the river should not block its use as a waterway. It is to be understood, however, that the waters of some streams may properly be devoted to a particular purpose to the exclusion of all other uses, as, for instance, in the great reclamation projects of the arid areas of the United States; but wherever it is possible the waters of the streams ought to serve many uses. River regulation, navigation, flood control, water conservation, and water utilization—all must be considered. Organizations promoting a Lakes-to-the-Gulf fourteen-foot waterway or any single-feature project are detrimental to a national waterway policy, since they base their demands on provincial and therefore selfish interests. Improvements on any stream which sacrifice one function of the waters to another are wasteful and undeserving of Government sanction.